UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

FRANCE TELECOM, S.A.,
Plaintiff,

v.

MARVELL SEMICONDUCTOR, INC.,
Defendant.

Case No. 12-cv-04967-WHO

CLAIM CONSTRUCTION ORDER

INTRODUCTION

Plaintiff France Telecom, S.A., brings suit against defendant Marvell Semiconductor, Inc. ("Marvell"), alleging infringement of United States Patent No. 5,446,747 ("the '747 Patent"). The patent involves methods commonly referred to as "turbo coding" for correcting errors in telecommunication and other data transmissions. At issue in the *Markman* hearing were the meaning of the terms "convolutional coding," "systematic convolutional coding," and "data element" as they would have been understood by a person of ordinary skill in the art when the patent was filed. Based on the parties' briefs and argument of counsel, I construe the disputed terms as described below.

LEGAL STANDARD

Claim construction is a matter of law. *See Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996); *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). Terms contained in claims are "generally given their ordinary and customary meaning." *Vitronics*, 90 F.3d at 1582. In determining the proper construction of a claim, a court begins with the intrinsic evidence of record, consisting of the claim language, the patent specification, and, if in evidence, the prosecution history. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005);

see also Vitronics, 90 F.3d at 1582. "A claim term used in multiple claims should be construed consistently . . . ." *Inverness Med. Switzerland GmbH v. Princeton Biomeditech Corp.*, 309 F.3d 1365, 1371 (Fed. Cir. 2002).

"The appropriate starting point [ ] is always with the language of the asserted claim itself." *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186 (Fed. Cir. 1998). "[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application."[1] *Phillips*, 415 F.3d at 1312. "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

"Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Phillips*, 415 F.3d at 1313. "Claims speak to those skilled in the art," but "[w]hen the meaning of words in a claim is in dispute, the specification and prosecution history can provide relevant information about the scope and meaning of the claim." *Electro Med. Sys., S.A. v. Cooper Life Scis., Inc.*, 34 F.3d 1048, 1054 (Fed. Cir. 1994) (citations omitted). "[T]he specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term." *Vitronics*, 90 F.3d at 1582. "However, claims are not to be interpreted by adding limitations appearing only in the specification." *Id.* "Thus, although the specifications may well indicate that certain embodiments are preferred, particular embodiments appearing in a specification will not be read into the claims when the claim language is broader than such embodiments." *Id.* Conversely, "where [ ] the claim language is unambiguous, [the Federal Circuit has] construed the claims to

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[1] Marvell submitted the Declaration of Dr. Paul S. Min in support of its Response brief. Dkt. No. 93. Dr. Min contends that, with regard to the '747 Patent, a person of ordinary skill in the art at the time of the invention "would have at least (1) a Master's degree in electrical engineering or a related field (2) with at least three years['] experience in communications." Min Response Decl. ¶ 22.

exclude all disclosed embodiments." *Lucent Techs., Inc. v. Gateway, Inc.*, 525 F.3d 1200, 1215-16 (Fed. Cir. 2008). "[T]he description may act as a sort of dictionary, which explains the invention and may define terms used in the claims," and the "patentee is free to be his own lexicographer," but "any special definition given to a word must be clearly defined in the specification." *Markman*, 517 U.S. at 989-90.

On the other hand, it is a fundamental rule that "claims must be construed so as to be consistent with the specification." *Phillips*, 415 F.3d at 1316. "The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998).

Finally, the court may consider the prosecution history of the patent, if in evidence. *Markman*, 52 F.3d at 980. The prosecution history may "inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Phillips*, 415 F.3d at 1317 (citing *Vitronics*, 90 F.3d at 1582-83); *see also Chimie v. PPG Indus., Inc.*, 402 F.3d 1371, 1384 (Fed. Cir. 2005) ("The purpose of consulting the prosecution history in construing a claim is to exclude any interpretation that was disclaimed during prosecution.") (internal quotations omitted).

In most situations, analysis of this intrinsic evidence alone will resolve claim construction disputes. *Vitronics*, 90 F.3d at 1583. However, "it is entirely appropriate . . . for a court to consult trustworthy extrinsic evidence to ensure that the claim construction it is tending to from the patent file is not inconsistent with clearly expressed, plainly apposite, and widely held understandings in the pertinent technical field." *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1309 (Fed. Cir. 1999). Extrinsic evidence "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Markman*, 52 F.3d at 980. All extrinsic evidence should be evaluated in light of the intrinsic evidence, *Phillips*, 415 F.3d at 1319, and courts should not rely on extrinsic evidence in claim construction to contradict the meaning of claims discernible from examination of the claims, the

written description, and the prosecution history, *Pitney Bowes*, 182 F.3d at 1308 (citing *Vitronics*, 90 F.3d at 1583). While extrinsic evidence may guide the meaning of a claim term, such evidence is less reliable than intrinsic evidence. *Phillips*, 415 F.3d at 1318-19.

DISCUSSION

I. BACKGROUND

The patent at issue addresses a method to, among other things, correct errors in the transmission of telecommunications. To understand the patent, some background information is useful.

Information can be transmitted in the form of digital data that are generally comprised of a series of bits, or 1s and 0s, arranged in a particular order. Response (Dkt. No. 91) 4. "Coding" is the mathematical processing of a sequence of bits (input data) to create another sequence (output data), often with more bits, to represent the input bits. Response 4. Data sent between a transmitter and receiver can be corrupted by "noise," i.e., interference from other sources, or some of the data may be lost or otherwise distorted during transmission. Br. 2; Min Response Decl. ¶ 26. Coding can be used to correct or reduce the effect of errors in data transmission by building in redundancy in the data. Response 4; Min Response Decl. ¶ 26. "By coding the data, it is possible to reconstruct the data without re-transmitting the data." Response 4 (citing Min Response Decl. ¶ 26). This process is called "error correction coding." Min Response Decl. ¶ 26. Convolutional coding "is one of the principal types of prior art error-correcting coding" that a person of ordinary skill in the art would have recognized as one of two different types of codes in common use at the time of the invention, the other type being block coding. Br. 6 (citing Koehl Br. Decl. Ex. 2 at FT004445).

Non-systematic coding involves taking input data, coding it, transmitting only the coded bits, and then decoding that output data. "Systematic" coding is a technique in which both the input data bits *and* the coded data bits are transmitted.

"Forward error correction coding" minimizes noise-corruption by encoding the input data in the transmitter at the time of transmission and decoding the processed data when it arrives at the receiver. Br. 2. The '747 Patent discloses a method of forward error correction—turbo codes—

which is among the methods of transmitting data closest to approaching the theoretical limit of maximum data transfer rate. Br. 2. France Telecom claims that the '747 Patent's turbo code method increases data rate transfer capability while decreasing the amount of power required for transferring, thus enabling high-speed wireless communication at low power, as required for third-generation, i.e., 3G, and higher mobile communications. Br. 2.

Instead of a single encoder at the transmitter and a single decoder at the receiver, turbo coding uses at least two parallel encodings at one end and an iterative decoding procedure at the other. When the data are transmitted, they take the following forms: an uncoded element, i.e., the original data; a coded element, derived by processing the uncoded element through an encoder to generate a coded element; and another coded element, modifying the original data by using an interleaver and then encoding the result in a coder to generate another coded element. Modifying the order of the original data elements by using an interleaver adds a degree of randomness between the two encodings, making it less likely that any burst of noise corrupting an element generated by one encoding will corrupt the corresponding element generated by the other encoding.

At the decoding end, the data are decoded iteratively, allowing the decoder to refine the decoding results after each iteration. Having two systematic convolutional coding streams, one of which is presented in different order because of the interleaver, helps the turbo code decoder improve its determination of the original data by comparing results from each stream until a solution arises. The transmitted data are triangulated so that what is most likely the original message is derived. The more comparisons, the better the results.

II. "CONVOLUTIONAL CODING" (CLAIM 1)

France Telecom's Proposed Construction	Marvell's Proposed Construction
No construction necessary, or if the Court concludes construction is necessary, "codes that associate to each source data element at least one coded data element which is a combination of the source data element and at least one previous source data element"	"calculating an output data element representing current input data and prior input data"

I adopt France Telecom's construction, modified as suggested by France Telecom at the

hearing[2]: "coding that associates to each source data element at least one coded data element which is a combination of the source data element and at least one previous source data element." The '747 Patent actually defines "convolutional coding," and its construction is a "compact" form of the definition that closely follows the specification's express language. Br. 7.

Where the patent itself defines a term, that definition should generally control. *Thorner*, 669 F.3d at 1365. As France Telecom points out, the '747 Patent defines "convolutional codes" as "codes that associate at least one coded data element with each source data element, this coded data element being obtained by the summation of modulo 2 of this source data element with at least one of the preceding source data elements." '747 Patent 1:46-50. France Telecom's proposed construction condenses the patent's language, but I find that it accurately does so. *See Network Prot. Scis., LLC v. Fortinet, Inc.*, No. 12-cv-1106-WHA, 2013 WL 146033, at *5 (N.D. Cal. Jan. 14, 2013) (allowing construction based on a "reworded" definition in patent). While Marvell is correct that the patent only defines "convolutional *codes*" as opposed to "convolutional *coding*," there is no material difference between the two. "Convolutional coding" produces "convolutional codes."

The pivotal language begins with "[c]onvolutional codes are . . . ." The patentee therefore appears to be acting as his own lexicographer. Marvell disagrees because the patentee did not put quotes around "convolutional codes." Response 9. The cases it cites for that proposition, however, do not say that quotation marks are necessary for the patentee to act as his own lexicographer—they only say quotation marks are a "strong indication" that what follows is a definition. *Sinorgchem Co. v. Int'l Trade Comm'n*, 511 F.3d 1132, 1136 (Fed. Cir. 2007); *Oracle Am., Inc. v. Google Inc.*, No. 10-cv-3561-WHA, 2012 WL 243263, at *3 (N.D. Cal. Jan. 25, 2012). France Telecom correctly quotes *Sinorgchem* for the proposition that "the word 'is' . . . may 'signify that a patentee is serving as its own lexicographer.' As such, the patentee must be bound by the express definition." 511 F.3d 1132 at 1136 (citation omitted).

Marvell also argues that France Telecom's construction should be rejected because it is

[2] Tr. 66:6.

"based on a description ***of the output of the claimed method***, rather than ***of the claimed step***." Response 8 (original emphasis); *see also* Tr. 52:20-21, 55:8-13. It says that France Telecom's alleged definition refers to prior art and a convolution *code* rather than *coding*—there are many ways of producing convolutional codes, but the patent refers to a particular method, of which two steps are convolutional coding, one preceded by interleaving. Response 9. Thus, contrary to France Telecom's assertion, the specification does not provide a special meaning for the term. Marvell also argues that "the specification acknowledges that 'convolutional coding' was well-known in the art." Response 7 (citing '747 Patent 8:51-53). Despite that, there is "no express definition of the step of convolutional coding" in the patent specification, nor is there anything in the prosecution history to suggest a special meaning, though the patentee "relied on the well-known understanding of 'convolutional coding' in the prior art." Response 8 (citing Min Response Decl. Ex. Q at FT000244-45).

Marvell correctly observes that the disputed term is disclosed in Claim 1 within the phrase "two independent and parallel *steps* of systematic convolutional coding." '747 Patent 14:48-49 (emphasis added). However, Marvell has provided no convincing argument why the fact that the method to be performed consists of two independent steps of convolutional coding means that the output of each step is not a convolutional code.[3] Defining the result of a process often involves incorporating the definition of the process itself in some manner; that France Telecom's construction refers to the result of convolutional coding does not detract from its construction. Similarly, even if convolutional coding was a well-known method or consisted of many different methods at the time of the patent's filing, I find it critical that the patent nonetheless defines it. If the patent itself discloses a definition for a term, that definition should generally be the one that controls.

Marvell argues, "The problem with France Telecom's alternate construction is that it defines each step of 'convolutional coding' using the phrase 'previous source data elements' rather than referring to the data elements input into the step." Response 8. The parties agreed to define

[3] Marvell is also incorrect that France Telecom's construction is based on a description of the claimed "method"—the specification makes no such distinction. *See* '747 Patent 1:46-50.

"source data element" as "data element to be coded ***by the claimed method***," not each constituent coding step of the claimed method. Response 8 (citing Min Response Decl. ¶ 39). But a person of ordinary skill in the art would understand that a step of convolutional coding uses the bits of data input to that coding step. Response 8 (citing Min Response Decl. ¶ 40). Though that data can be source data elements, it can also be other data elements. Marvell asserts that this is important in Claim 1 "because at least one of the claimed coding steps ***receives an input that is not source data elements***"—Claim 1 requires at least one coding step to receive the output of the temporal-interleaving step, which changes the order of the data elements presented to one coding step. Response 9 (citing '747 Patent 14:53-56) (original emphasis). Looking to Figure 1 in the patent, one of the steps of systematic coding receives interleaved data, which is not a "source data element." Tr. 61:12-62:3.

Marvell is mistaken. The inputs to both coding steps are still the same source data elements "to be coded by the claimed method." While the source data elements are "taken into account" and rearranged into a different order in the temporal-interleaving step, there is nothing in the claim to suggest that the "source data elements" that go through the "two independent and parallel steps of systematic convolutional coding," one set of which goes through "temporal[ ] interleaving," are not ultimately the same "source data elements" or that the output of the interleaving no longer consists of "source data elements." Indeed, Claim 4 still refers to the output of the temporal interleaving step as "source data elements." '747 Patent 15:1-2. Whether first interleaved or not, the source data elements are still "source data elements" that are ultimately "coded by the claimed method." There is no conflict with the parties' stipulated definition.

Finally, Marvell argues that extrinsic evidence supports its construction, citing two other patents that purportedly define the term and an article that discusses it. Response 8. Moreover, Marvell's limited arguments in favor of its own construction are unpersuasive, especially because Marvell does not explain its evidence in context or link it to its own construction. Marvell's expert did not help in this regard. He said that "a 'source data element' refers to the data elements that are to be coded by the entire claimed coding method – not each independent coding step that is part of the claimed coding method." Min. Response Decl. ¶ 39. However, Claim 1 explicitly

states that the claimed method consists of two steps of convolutional coding, "each of said coding steps taking account of all of said source data elements." '747 Patent 14:49-51. Surprisingly, Marvell's expert does not even appear to know what France Telecom's proposed construction is. *Compare* Response 8 (correctly identifying France Telecom's construction as "codes that associate to each source data element at least one coded data element which is a combination of the source data element and at least one previous source data element") *with* Min Response Decl. ¶ 38 (identifying France Telecom's construction as "codes that associate at least one coded data element with each source data element, the coded data element being a linear combination of the source data element an [sic] some previous source data elements"). In any event, I do not need to rely on the extrinsic evidence because the patent itself sufficiently defines the disputed term. Marvell's extrinsic evidence is less reliable than the intrinsic evidence. *See Phillips*, 415 F.3d at 1318-19.

III. SYSTEMATIC CONVOLUTIONAL CODING (CLAIM 1)

France Telecom's Proposed Construction	Marvell's Proposed Construction
No construction necessary, or if the Court concludes construction is necessary, "convolutional coding in which the source data elements are transmitted jointly with coded data elements"	"convolutional coding where the output includes both the coded data and the current input data"

The parties agree that in "systematic" coding, copies of the uncoded data elements are transmitted along with the coded data elements. Br. 8 ("The parties apparently do not dispute that in 'systematic' coding, in addition to transmitting the coded data elements generated by an encoder, copies of the uncoded source data elements are also transmitted."); Response 10 ("[Systematic convolutional coding] was understood to mean a step of coding where the output includes both the coded data and the data input to the step."). Both parties also agree that the claims are silent about whether the input uncoded data elements are also provided as outputs of the systematic convolutional steps in Claim 1. Br. 10-11; Response 10, 13-14. However, France Telecom contends that the uncoded source data elements must only be transmitted jointly with the coded data elements, whereas Marvell contends that current input data must be included within the

output of each step. Br. 8; Response 14.

I adopt Marvell's proposed construction because it is supported by the clear language of the claim. As the Federal Circuit has instructed, "The appropriate starting point [in claim construction] is always with the language of the asserted claim itself." *Comark Commc'ns*, 156 F.3d at 1186. While "the specification is always highly relevant to the claim construction analysis . . . claims are not to be interpreted by adding limitations appearing only in the specification." *Vitronics*, 90 F.3d at 1582. Claim 1 discloses a "method for error-correction coding of source digital data elements" comprising two steps, the first of which requires "implementing at least two *independent* and parallel *systematic* convolutional coding, each of said coding steps taking account of all of said source data elements and providing parallel outputs of distinct series of coded data elements." '747 Patent 14:46-52 (emphases added). Because each coding step must be independently systematic, and both parties agree that the product of systematic coding must include both uncoded and coded data, Marvell's construction—which states that "the output includes both the coded data and the current input data"—accurately reflects Claim 1's plain meaning. It is not enough that the input data are "transmitted jointly" with the coded data, but are not part of the product of *each step*, for both steps to be independently systematic, as France Telecom submits.

Marvell's construction is also supported by the specification. Figure 1 of the patent illustrates the "coding method of the invention." '747 Patent Fig. 1, 7:9. The figure contains a transmission path where a source data element d is transmitted and outputted without passing through a coder. *See* '747 Patent Fig. 1, 8:12-13. The figure also contains two systematic convolutional coding modules representing the two steps of independent and parallel systematic convolutional coding. *See* '747 Patent 7:60-64. The patent states that these two modules can use a coder as illustrated in Figure 7. '747 Patent 7:25-28, 8:33-35. Figure 7, in turn, shows two transmission pathways: one in which the source data element d_k is transmitted without being coded, resulting in X_k, and another in which d_k is coded, resulting in Y_k. The patent confirms that Figure 7 transmits data systematically, *see* '747 Patent 8:16-22, which is in turn confirmed by the parties' understanding that this requires the coded and uncoded data to be transmitted together.

Consistent with Marvell's construction, each of the coding modules in Figure 1 must therefore output both coded and uncoded data to conduct systematic coding.

France Telecom argues that the claim language and specification are consistent with the understanding that source code elements are transmitted "alongside" the coded data elements—they need not be part of the same output. Br. 9. It asserts that the specification explains that "in systematic coding[,] the source data elements are regularly and methodically transmitted alongside the coded data elements." Br. 9. "For example, in the principal embodiment, 'a data element X equal to the source data element d, is transmitted systematically.'" Br. 9 (quoting '747 Patent 8:12-14). In addition, concerning Figure 7, the patent states, "The data element X_k is systematically taken to be equal to the source value d_k." Br. 9 (quoting '747 Patent 8:38-39). Finally, "the at least two coding modules in this embodiment use codes 'characterized by the fact that the source data element is transmitted systematically, jointly with at least one coded data element or redundancy symbol.'" Br. 9 (quoting '747 Patent 8:20-22).

France Telecom's citations are unconvincing. It does not explain why the fact that "a data element X equal to the source data element d[ ] is transmitted systematically" necessarily support its construction. The same is true of the statement that "The data element X_k is systematically taken to be equal to the source value d_k." These statements do not validate France Telecom's construction, nor are they inconsistent with Marvell's construction.

France Telecom contends that the source data elements are just transmitted once in systematic convolutional coding. Tr. 6:18-19. It asserts that "systematic" as described in the specification means that "the uncoded source data elements may be transmitted once and ***shared*** by both outputs." Br. 9 (original emphasis). It cites the patent as stating, "The redundant codes used are of a systematic type. Each source data element is therefore also a convolutional coding symbol, and this symbol is shared by both codes." Br. 9 (citing '747 Patent 3:32-35). Figure 1 and the detailed description allegedly show this: the source data element is transmitted systematically "jointly with" the coded data elements. Br. 10 (citing '747 Patent 8:12-22). Although France Telecom allows that the modules in Figure 1 *can* take an input source data element and output it as a coded data element, France Telecom insists that it does not need to do

so if the uncoded data element "can be obtained elsewhere." Br. 10. In particular, France Telecom looks to the transmission pathway from d to X in Figure 1 as providing the uncoded data that, combined with the coded data coming out of each coding module, makes the entire representation in Figure 1 "systematic." Br. 9. France Telecom further argues that, contrary to Marvell's claim that Figure 7 comprises the whole of each step of systematic coding depicted as modules 11 and 13 in Figure 1, those modules are each comprised of only a portion of Figure 7, namely elements 81, 82, and 83. Reply 6. In addition, the line from d_k to X_k in Figure 7 corresponds to the line from d to X in Figure 1. Reply 6-7.

Marvell disagrees. It asserts that "Figure 7 [which represents the modules in Figure 1] represents one convolutional coding step that is systematic – it produces two data elements for each input data element. . . . There is no suggestion in the patent that a 'systematic coding step' need not output X_k if it can be obtained elsewhere, as France Telecom suggests." Response 13. Marvell argues that the coder in Figure 7 "do[es] not describe the structure that performs ***the claimed method*** but rather an example of one coding step that could be used in place of items 11 or 13 in Figure 1." Response 11. It contends that because each input data element transmitted through the systematic coder of Figure 7 outputs two data elements—a coded data element and a data element equal to the input data—Figure 7 supports Marvell's construction.

France Telecom's arguments are unpersuasive. The patent explicitly discloses "two independent and parallel steps of systematic convolutional coding." '747 Patent 14:48-49. Accordingly, each of the two steps of coding must be "systematic." It is inconsistent with Claim 1 to assert that each of the two encodings that occur in Figure 1 only outputs coded data which, combined with a shared uncoded data element that "can be obtained elsewhere," makes each of the two coding steps "systematic." Claim 1 explicitly states that the patent discloses a method with "two *independent* and parallel steps of systematic convolutional coding." '747 Patent 14:48-49 (emphasis added). In other words, each step must itself be systematic—it is not enough that the whole method is systematic. Both references to Figure 7 in the patent indicate that Figure 7 is an example of the coder represented as modules 11 and 13 in Figure 1—there is no indication, as France Telecom would have it, that only a portion of Figure 7 makes up the modules. *See* France

Telecom Claim Construction Presentation 24. The whole of Figure 7 is systematic; a portion of it is not. As France Telecom does not dispute, coded and uncoded data elements must be transmitted together for coding to be systematic. Br. 8. The uncoded data cannot be "obtained elsewhere" or "shared" if each of the two steps in Claim 1 are to be systematic and independent. France Telecom's construction renders the two coding steps neither "independent" nor "systematic."

Although France Telecom argues that the patent's statement that the source data element "is shared by both codes" means that it is sufficient for the source data element to be "transmitted *alongside* the coded data elements," Br. 9 (quoting '747 Patent 8:34-35) (emphasis added), read in the context of the whole patent, that statement is better understood to mean that the source data element going into each systematic convolutional coding step is identical. *See Phillips*, 415 F.3d at 1313 (stating that a claim term should be read "not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification"). And though, as France Telecom correctly notes, the patent states that each step "provid[es] parallel outputs of distinct series of coded data elements," Br. 10 (quoting '747 Patent 14:51-52), it does not say that the steps output nothing else. While the claims are silent about whether the input uncoded data elements are also provided as outputs of the systematic convolutional steps (as France Telecom acknowledges), if each step is systematic, then each step necessarily includes the uncoded data element as output since France Telecom concedes that "copies of the uncoded source data elements are also transmitted" with the coded data elements in systematic coding. Br. 8. Here, both steps of coding must be systemic.

France Telecom asserts that while the patent discloses a method, as displayed in Figure 1, having a 1/3 efficiency rate, Marvell's construction would have a lower efficiency rate of 1/4 since 4 elements would be transmitted for each source data element: one convolutionally encoded data element (Y_{k1}), a second convolutionally coded data element (Y_{k2}), and two copies of the source data element (X). Reply 8. Marvell's construction requires that each input source data element be transmitted twice, once as part of each coding step. Br. 12. In contrast, France Telecom's construction provides for a 1/3 efficiency rate because the transmission of source data elements is

done once and shared. Reply 8. Thus, it is more efficient and consistent with the patent's objective. Accordingly France Telecom argues that Marvell's construction "is incompatible with the invention's stated aim of providing 'particularly efficient' methods for transmission in noisy channels" and "permitting highly reliable decoding of the received data." Br. 12 (quoting '747 Patent 2:43-46, 3:36-44). Marvell appears to concede that its construction results in a coding rate of 1/5, which appears to be less efficient than the 1/3 coding rate that France Telecom claims its construction provides. Tr. 42:6; Marvell Claim Construction Presentation 61. Indeed, it is less than the 1/4 coding rate that France Telecom claims Marvell's construction would entail. Reply 8.

This is not fatal, however, to Marvell's construction. As explained above, the patent's claim language is quite clear about what it requires. It may be true that Marvell's construction does not achieve a stated aim of the invention. But a "very high overall coding efficiency rate" is only one of several aims identified in the patent: accuracy[4] is the first one listed, and reliability and easy manufacturing are also additional objectives. '747 Patent 2:36-37, 2:44, 2:51, 2:59-60. More importantly, even if the patent fails to achieve one of the goals of the inventor, a patent's stated objective cannot serve as a limitation on the claims. *Cf. Northrop Grumman Corp. v. Intel Corp.*, 325 F.3d 1346, 1355 (Fed. Cir. 2003). Further, neither the patent nor, more specifically, its claims require the coding rate to be 1/3. In fact, the claims are silent about rates altogether—if the inventor wanted to claim a certain coding rate, he could have done so, but he did not.

France Telecom argues that Marvell's proposed construction would exclude "every" embodiment of the invention. Br. 11. If Marvel's construction holds, then in Figure 1, both boxes 11 and 13 would have to show an X output. But Claim 1 "does not require that the (at least two) systematic convolutional coding steps directly output copies of the source data element X." Br. 11. Marvell disagrees and argues that Figures 1 and 2 "at best do not provide sufficient detail to determine [whether] these embodiments would be covered by [C]laim 1. There may be other inputs and outputs that are not illustrated." Response 14. "Thus, if Figures 1 and 2 are not meant

[4] While the parties did not brief this issue, it appears that there can be a tradeoff between efficiency and accuracy because the more modules a system has, the more accurate it may be though the efficiency rate decreases.

to be exclusionary – that is, if not all outputs from the coders are depicted – then these figures do not contradict Marvell's proposed construction." Response 14. If they are exclusionary and depict all inputs and outputs, then Marvell argues that they "contradict the express claim language." Citing *Lucent Technologies, Inc. v. Gateway, Inc.*, 525 F.3d 1200 (Fed. Cir. 2008), Marvell argues that claims need not be construed to cover the preferred embodiment." Response 14. Because "the claim language unambiguously requires at least two steps of *systematic* convolution coding . . . "[t]he fact that Figure 1 and Figure 2 may not be covered by the claims under Marvell's construction does not dictate a different construction here . . . ." Response 15. France Telecom counters that *Lucent Technologies* and other cases which state that claims should not be rewritten to cover a disclosed embodiment only apply when the claim language is unambiguously and directly contrary to what is disclosed, which is not the case here, "where the specification and claims are consistent." Reply 9.

I agree with Marvell on this point. *Lucent Technologies* states that when "the claim language is unambiguous," it is proper to "construe[ ] the claims to exclude all disclosed embodiments" that conflict with the claims. 525 F.3d at 1215-16. Claim 1 is unambiguous that the two steps of systematic convolutional coding must be independent. For the two steps to share the same uncoded data element would render both of them non-systematic. As explained above, it is not apparent that the disclosed embodiments conflict with Marvell's construction—although at times ambiguous, the specification largely supports Marvell. To the extent that the disclosed embodiments are directly contrary to the claim language, the embodiments cannot serve as limitations on the plain language of the claims.

Marvell argues that the extrinsic evidence supports it. A 1987 article by Gottfried Ungerboeck says that "[w]ith a systematic encoder, the input bits appear unchanged at the output." (Min Response Decl. Ex. F at MSIFT00039463). A 1989 article by Tom Fuja states that a systematic generator "is one which, when implemented, causes [a] message to be reproduced exactly in the code sequences." (Min Response Decl. Ex. G at MSIFT00040383). A 1970 article by G. David Forney, Jr., discusses a convolutional encoder in which the outputs are "two binary sequences" where the first output sequence "is simply equal to the input [ ] (hence the code is

systemic)." (Min Response Decl. Ex. H at MSIFT00040392-93). Thus, a step of coding includes the input data as part of the coded data. Response 12. "The extrinsic evidence does not disclose a systematic convolutional coding step that only provides coded data as an output without also providing the input data as an output." Response 12.

France Telecom responds that the extrinsic evidence cited by Marvell is "irrelevant" because "it does not deal with how one would understand the term 'systematic convolutional coding' in the context of **parallel** convolutional steps." Reply 8 (original emphasis). Citing to a 2008 publication, TOM RICHARDSON & RÜDIGER URBANKE, MODERN CODING THEORY (2008), France Telecom argues "the full historical record shows that[ ] persons of ordinary skill in the art" understand that "a standard parallel concatenated turbo code with two concatenated codes sends three streams of data." Reply 8-9 (citing Koehl Reply Decl. Ex. 1 at FT0004432). France Telecom does not provide further explanation. When asked at the hearing how extrinsic evidence from 2008 would apply to a patent filed in 1992, France Telecom responded that the patentee invented parallel concatenation coding, which explains why there is no earlier evidence of how persons of ordinary skill in the art would have understood this term. Tr. 11:10-21.

Because the intrinsic evidence—in particular, the claim language itself—supports Marvell's construction, and because neither party sufficiently explains the extrinsic evidence it cites, I need not consider the extrinsic evidence to reach my construction of "systematic convolutional coding."

IV. "AT LEAST TWO INDEPENDENT AND PARALLEL STEPS OF SYSTEMATIC CONVOLUTIONAL CODING" (CLAIM 1)

France Telecom's Proposed Construction	Marvell's Proposed Construction
No construction necessary, or if the Court concludes construction is necessary, "at least two steps of systematic convolutional coding that are performed in parallel rather than in series, including without limitation as shown in Figures 1 and 2"	"at least two separate and distinct steps of systematic convolutional coding, not in series, simultaneously carried out"

The parties agree that this term does not need construction. Dkt. No. 119. Accordingly, I will not construe it.

V. "DATA ELEMENT" (CLAIMS 1 & 10)

France Telecom's Proposed Construction	Marvell's Proposed Construction
No construction necessary, or if the Court concludes construction is necessary, "a single unit of data"	"a bit or series of bits"[5]

I agree with France Telecom's construction that "a single unit of data" most accurately defines "data element" in Claims 1 and 10. The specification uses "data element" more broadly than to refer only to a bit or series of bits. For example, it "can be a symbol." Br. 17 (citing, e.g., '747 Patent 1:51, 1:54, 2:12, 3:30, 3:34, 3:55). In some cases, a data element can be binary. Br. 17 (citing '747 Patent 9:24-27, 11:32-33). In other cases, a data element is a "real variable" and "are not binary 0s or 1s," but can be "approximated as 'samples coded on n bits,'" though not necessarily so. Br. 17 (citing '747 Patent 11:30-44, 13:59-60). France Telecom argues that its proposed construction is consistent with all of these examples. It also contends that dictionary definitions support its proposed construction as a unit of data, Br. 18 (citing Koehl Br. Decl. Exs. 5-7), and that Marvell's construction unjustifiably limits a broader term to just bits.

Marvell asserts that "the field of the invention is that of the coding of digital data," '747 Patent 1:10-11, and digital data are represented by bits, Min Response Decl. ¶ 61. And "[w]hile symbols or real variables might be used, as France Telecom argues . . . the type of coding and processing disclosed in the patent will be performed on a bit level, after the symbols or real variables have been converted to digital bits." Response 21 (citing Min Response Decl. ¶ 69); *see also* Tr. 74:11-75:16. Thus, all of data referenced in the portions of the '747 Patent cited by France Telecom would ultimately become bits. *See* Surreply 7 (citing Min Surreply Decl. ¶¶ 23-25). And nothing in the prosecution history indicates that the data to be processed are not bits or series of bits. Response 21.

France Telecom responds that Marvell's proposed construction "reaches *any* sequence of binary data." Br. 18 (original emphasis). France Telecom rejects Marvell's assertion that all the data elements are ultimately converted to digital bits because "[t]he patent actually states the

[5] On December 12, 2013, Marvell changed its construction to this. Dkt. No. 119.

contrary, noting that data elements *can* be sampled on digital bits, but 'ideally' they are not . . . ." Reply 14 (citing '747 Patent 11:30-32).

While I am somewhat inclined to conclude that no construction is necessary because the plain and ordinary meaning of the disputed term may be apparent and understandable to the jury, the term "data element" may also sound technical. France Telecom's proposed construction of "a single unit of data" is more faithful to the term and has the benefit of being simpler and more understandable—a "data element," or an element of data, is appropriately understood as "a single unit of data." Marvell concedes that France Telecom's construction is not inaccurate. Tr. 75:22. As used in the patent, I conclude that the disputed term is properly construed as such.

While Marvell is correct that the field of the invention involves digital data, the patentee knew how to use the term "digital data element" when he wanted to do so. *See, e.g.*, '747 Patent 14:47, 15:31. The patent's claims and specification repeatedly refer to "data" but almost never mentions bits. And while Marvell may also be correct that the "the type of coding and processing disclosed in the patent will be performed on a bit level, after the symbols or real variables have been converted to digital bits," Response 21, I find no need to redefine the disputed term to account for the processes disclosed in the patent that will ultimately be applied to the data elements or to narrow the relevant claims more than the language warrants. Given its concession that France Telecom's construction is not inaccurate, Marvell's primary argument in favor of its own construction is that "the jury might just think of other things that are physical elements" and that France Telecom's construction "really doesn't add much." Tr. 75:23, 76:2-3. I am unpersuaded that the jury will be confused by France Telecom's construction.

VI. "ITERATIVE DECODING PROCEDURE" (CLAIM 10)

France Telecom's Proposed Construction	Marvell's Proposed Construction
No construction necessary, or if the Court concludes construction is necessary, "a decoding procedure involving repetition of one or more steps with the goal of achieving successively improved results"	"process for decoding data by repeating the same sequence of decoding steps"

The parties agree that this term does not need construction. Dkt. No. 119. Accordingly, I

will not construe it.

CONCLUSION

For the reasons above, I construe the disputed terms as follows:

- "Convolutional coding" is "coding that associates to each source data element at least one coded data element which is a combination of the source data element and at least one previous source data element."
- "Systematic convolutional coding" is "convolutional coding where the output includes both the coded data and the current input data."
- "Data element" is "a single unit of data."

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Marvell has filed a motion for summary judgment currently scheduled to be heard on April 9, 2013. After the motion hearing, I will hold a case management conference at which the parties should be prepared to discuss the case management schedule and other pertinent issues assuming the motion for summary judgment is denied. The parties shall file a joint case management statement one week before the hearing and case management conference.

IT IS SO ORDERED.

Dated: March 12, 2014

WILLIAM H. ORRICK
United States District Judge